

CLAIMS

What is claimed is:

1. An isolated polynucleotide comprising:
 - 5 (a) a first nucleotide sequence encoding a first polypeptide having 5,10-methylenetetrahydrofolate reductase activity, wherein the first polypeptide has an amino acid sequence of at least 85% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:6;
 - 10 (b) a second nucleotide sequence encoding a second polypeptide having 5,10-methylenetetrahydrofolate reductase activity, wherein the second polypeptide has an amino acid sequence of at least 90% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:17; or
 - 15 (c) a complement of the nucleotide sequence of (a) or (b), wherein the complement and the nucleotide sequence consist of the same number of nucleotides and are 100% complementary.
2. The polynucleotide of Claim 1, wherein the amino acid sequence of the first polypeptide has at least 90% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:6.
- 20 3. The polynucleotide of Claim 1, wherein the amino acid sequence of the first polypeptide has at least 95% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:6, and wherein the amino acid sequence of the second polypeptide has at least 95% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:17.
- 25 4. The polynucleotide of Claim 1, wherein the amino acid sequence of the first polypeptide comprises SEQ ID NO:6, and wherein the amino acid sequence of the second polypeptide comprises SEQ ID NO:17.
5. The polynucleotide of Claim 1 wherein the first nucleotide sequence comprises SEQ ID NO:5.
- 30 6. A vector comprising the polynucleotide of Claim 1.
7. A recombinant DNA construct comprising the polynucleotide of Claim 1 operably linked to at least one regulatory sequence.
8. A method for transforming a cell, comprising transforming a cell with the polynucleotide of Claim 1.
- 35 9. A cell comprising the recombinant DNA construct of Claim 7.

10. A method for producing a plant comprising transforming a plant cell with the polynucleotide of Claim 1 and regenerating a plant from the transformed plant cell.

11. A plant comprising the recombinant DNA construct of Claim 7.

5 12. A seed comprising the recombinant DNA construct of Claim 7.

13. An isolated polypeptide having 5,10-methylenetetrahydrofolate reductase activity, comprising:

- 10 (a) a first polypeptide wherein the first polypeptide has an amino acid sequence of at least 85% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:6; or
- (b) a second polypeptide wherein the second polypeptide has an amino acid sequence of at least 90% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:17.

15 14. The polypeptide of Claim 13, wherein the amino acid sequence of the first polypeptide has at least 90% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:6.

20 15. The polypeptide of Claim 13, wherein the amino acid sequence of the first polypeptide has at least 95% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:6, and wherein the amino acid sequence of the second polypeptide has at least 95% sequence identity, based on the Clustal V method of alignment, when compared to SEQ ID NO:17.

16. The polypeptide of Claim 13, wherein the amino acid sequence of the first polypeptide comprises SEQ ID NO:6, and wherein the amino acid sequence of the second polypeptide comprises SEQ ID NO:17.

25 17. A method for isolating a polypeptide having 5,10-methylenetetrahydrofolate reductase activity comprising isolating the polypeptide from a cell or culture medium of the cell, wherein the cell comprises a recombinant DNA construct comprising the polynucleotide of Claim 1 operably linked to at least one regulatory sequence.

30 18. A method of altering the level of expression of a 5,10-methylenetetrahydrofolate reductase in a host cell comprising:

- (a) transforming a host cell with the recombinant DNA construct of Claim 7, and
- 35 (b) growing the transformed host cell under conditions that are suitable for expression of the recombinant DNA construct,

wherein expression of the recombinant DNA construct results in production of altered levels of the 5,10-methylenetetrahydrofolate reductase in the transformed host cell.

- 5 19. A method for evaluating at least one compound for its ability to inhibit 5,10-methylenetetrahydrofolate reductase activity, comprising the steps of:
- 10 (a) introducing into a host cell the recombinant DNA construct of Claim 7;
 - (b) growing the host cell under conditions that are suitable for expression of the recombinant DNA construct wherein expression of the recombinant DNA construct results in production of a 5,10-methylenetetrahydrofolate reductase;
 - (c) optionally purifying the 5,10-methylenetetrahydrofolate reductase from the host cell;
 - 15 (d) treating the 5,10-methylenetetrahydrofolate reductase with a compound to be tested;
 - (e) comparing the activity of the 5,10-methylenetetrahydrofolate reductase that has been treated with a test compound to the activity of an untreated 5,10-methylenetetrahydrofolate reductase, and selecting compounds with potential for inhibitory activity.

20